SOCIETIES AND ACADEMIES

LONDON

Royal Society, Jan. 20.—Certain cases of electromotive force sustained by the action of electrolytes on electrolytes, by J. Hopkinson. Communicated by Sir W. Thomson.

On reversed photographs of the solar spectrum beyond the red, obtained on a collodion plate, in a letter to Prof. Stokes, by Capt. J. Waterhouse, Assistant Surveyor-General of India. Communicated by Prof. Stokes.

Jan. 27.—Contributions to the minute anatomy of the thyroid gland of the dog, by E. Cresswell Barer, M.D., Lond. Communicated by Dr. Klein, F.R.S.

Results of the monthly observations of magnetic dip, horizontal force, and declination made at the Kew Observatory, from April 1869 to March 1875 inclusive, by the Kew Committee.

Researches on the minute anatomy of the alimentary canal, by Herbert Watney, M.A., Demonstrator of Microscopical Anatomy at St. George's Hospital. Communicated by Dr. Klein, F.R.S., Assistant Professor in the Brown Institution.

Linnean Society, Jan. 20.—Prof. G. J. Allman, F.R.S., president, in the chair.—Prof. Oliver communicated a short paper, by Prof. H. G. Reichenbach, being the twenty-ninth contribution to the botany of the *Challenger*, viz., On some Orchidaceæ collected by Mr. Moseley of the *Challenger* expedition, in the Admiralty Islands, Ternate, and Cape York—one of which forms the type of a new section of the genus *Dendrobium*.—The Fungi of Brazil, by the Rev. M. J. Berkeley and Dr. M. C. Cooke. The authors include the collection made by Mr. J. H. Trail in 1874, and state that all the Brazilian fungi yet known amount to but 437 species. Among these there are of Hymenomycetes, 356; Gasteromycetes, 13; Hyphomycetes, 7; Coniomycetes, 5; Ascomycetes, 55; incomplete, 1—total, 437. About 300 of these are confined to Brazil, the remainder found in other parts of the world. The great Brazilian region, therefore, with but 437 representatives, contrasts with 886 enumerated for Cuba, and 1,190 for Ceylon. This paucity of species in the first-mentioned area, the authors suggest, may be due to incompleteness of collection, or presumably as yet deficient knowledge of microscopical forms.—On a new species of oak from the Sikkim Himalaya, by Dr. George King, F.L.S., Supt., Roy. Bot. Gard., Calcutta. This, the *Quercus Andersoni*, or "Katoos" of the Nepaulese, is one of the finest forest trees, and largely used by the European residents of Darjeeling. It occurs at higher altitudes than *Q. spicata*, and in other respects differs.—On Steere's sponge, a new genus of the Hexactinellid order of the Spongidæ, by Dr. James Murie. Obtained in deep water between the islands of Negros and Zebu, the present adds one more rarity to the already remarkable sponge fauna of the Philippines. The siliceous skeleton of *Dendrospongia steereii* bears resemblance to a branching coral or shrub, and is nearly three feet high. A peculiar rosette-like series of tufts form a continuous whorl, winding spirally up the branches. Microscopical examination shows the spicules to belong to the sexradiate type: the character of these, with the presence of a veil and other structural points, indicate its being an intermediate type between such forms as *Dactylocalyx*, *Aphrocallistes*, *Holtenia*, and *Meyerina*. The homology of the so-called root, body, and beard spicules of several of the siliceous sponges being noted, those of *Dendrospongia* are compared; the spiral tufts of the latter agreeing in many respects with the spicular fringes of *Euplectella*, &c.

Chemical Society, Feb. 3.—Prof. Abel, F.R.S., president, in the chair.—Mr. W. Ackroyd read a paper on metachromism, or colour change. Metachromism, from the Greek μετά, change, and χρῶμα, colour, is the term applied to the phenomenon investigated, viz., the change in colour observed in bodies when heated at comparatively low temperatures. For convenience sake colour-changing bodies were called metachromes. No mention is made of the subject in text-books, and only here and there in scattered memoirs. The views of Stahl, Delaval, Brewster, Schœnbein, Gladstone, and Houston and Thomson were spoken of and discussed. *Colour change takes place in the order of the spectrum colours: when a metachrome is expanding, in the violet to red order; when contracting, red to violet order.* Such colour change it was pointed out might be taken as an indication of expansion or contraction, the anomalously behaving body AgI fully bearing out the author's conclusions. Metachromes were divided into two classes: (1) the zinc oxide class; and (2) the borate of copper class. From a study of the two classes the following metachromatic scale was arrived at: white, colourless, violet, indigo, blue, green, yellow, orange, red, brown, black—metallic appearance. The colours of the more refrangible end may be replaced by a metallic appearance. Metachromism has an important bearing on allotropy. A body expanding through the influence of heat being really a continuous series of allotropes. In support of this the relation of colour and density was discussed. It was shown that metachromism is due to the storage of potential energy, the author holding that molecular vibrations or kinetic energy have nothing to do with this phenomenon of selective absorption. Contracting metachromes changing from less to more refrangible colours, where would this change cease providing a long enough temperature could be had? Presumably at the absolute zero of temperature, and at this point all metachromes would be white or metallic-looking, judging from their behaviour at attainable temperatures. Following expanding metachromes from this *absolute zero of colour*, the change in each would vary with the coefficient of expansion, giving us at the normal temperature all that diversity of hue which characterises the inorganic world. Including certain cases of decomposition (given in table) colour change may denote (1) If to more refrangible, α contraction or β decomposition; (2) If to less refrangible, α expansion or β combination. The observations relate to anhydrous and for the most part binary compounds.—Mr. W. H. Perkin, F.R.S., made a communication on the formation of anthra-purpurin, which it appears is the product of the action of caustic alkali on anthraquinone-disulphoric acid. The supposition that alizarin is formed under these circumstances being incorrect.—There were also papers on mattose, by Mr. C. O. Sullivan; on a simple form of gas regulator, by Mr. J. Fletcher; and on high melting points, with special reference to those of metallic salts, by Mr. T. Carnelley, B.Sc.

Zoological Society, Feb. 1.—Mr. G. R. Waterhouse, vice-president, in the chair.—The Secretary read some extracts from a report of a recent visit made by H.M.S. *Petrel* to the Galapagos Islands, communicated by the First Lord of the Admiralty, and referring to the tortoises met with in the different islands of the group.—Mr. Sclater exhibited and made remarks on an antler of a Rusa Deer, living in the Gardens of the Acclimatisation Society of Melbourne, which had been sent to him for identification.—Mr. Frederick Selous, jun., exhibited and made remarks on a series of horns of African Rhinoceroses procured by himself in South-eastern Africa.—Prof. T. H. Huxley, F.R.S., read a paper on the position of the anterior nasal aperture in Lepidosiren, which he showed to be strictly homologous with the position of these organs in other vertebrates.—Mr. A. H. Garrod read a paper on the anatomy of *Chauna derbiana*, and on the systematic position of the Screamers (*Palamedeidæ*), in which he controverted Prof. Parker's collocation of this form with the Anseres, and showed that it should occupy an independent position with relations to the Struthiones, Gallinæ, and Rallidæ.—A communication was read from Mr. F. Jeffrey Bell, containing notes on the myology of the limbs of *Moschus moschiferus*.—A communication was read from Dr. T. Spencer Cobbold on Entozoa, forming the third of a series of papers on this subject brought by him before the Society.—Mr. Herbert Druce read a list of butterflies collected in Peru, with descriptions of new species. To these were added some notes on some of the species, by Mr. Edward Bartlett.—Mr. A. G. Butler read some notes on a small collection of butterflies received from the New Hebrides.—A paper by Mr. P. L. Sclater and Mr. O. Salvin was read, in which they gave descriptions of some new birds obtained by Mr. C. Buckley, in Bolivia.

Physical Society, Jan. 29.—The president, Prof. Gladstone, F.R.S., in the chair.—The following candidates were elected members of the Society:—Sir John Conroy, Bart., and H. S. Burls.—The Secretary then read a communication from Mr. J. A. Fleming on the polarisation of electrodes in water free from air. The experiments described were undertaken in order to meet objections which had been raised by Prof. Rowland to a previous paper by the author, in which he endeavoured to show that when an electrolyte flows in a very strong magnetic field the electromotive force generated by its motion effects the electrolysis of the liquid, a fact which he holds to be proved by the subsequent polarisation of the electrodes. Prof. Rowland considered that the effect observed was due to the presence of dissolved air, and conversely, that in air-free water, at any rate with the same electromotive force, similar effects would not be observed. These doubts raise the two questions (1) in air-free water can platinum electrodes be polarised by a very small electromotive

force to the same degree and with the same facility as in aërated water, and (2) is this very feeble polarisation really a decomposition of the electrolyte? To test the first point experiments were made with a voltameter containing dilute sulphuric acid which had been previously boiled, the voltameter being connected with a Sprengel pump. The platinum plates were acted on by a very small external electromotive force for one minute, and the effect of the polarisation current due to this action noticed on an extremely delicate galvanometer, the effect of the direct current employed being also noted. After a series of observations had been made, using different amounts of electromotive force, the dilute acid was removed, and, after being thoroughly aërated, replaced in the voltameter. On repeating the experiments with this one change in the conditions, the results obtained were almost identical, from which fact the author concludes that the first question may be answered in the affirmative. With regard to the second, Mr. Fleming believes that the assertion that polarisation is decomposition of the electrolyte has never been called in question, and in proof of it, describes an experiment showing that when aciduated water flows rapidly past slightly polarised plates, the current which they give is very much diminished, while by causing the water to flow slowly but slight change is produced. This seems to indicate that there is something on the plates which can be *wiped off* mechanically, and it can only be a product of electrolysis.—Prof. Foster, while admitting the accuracy of Mr. Fleming's experiments, doubted whether he was justified in definitely ascribing polarisation to chemical action. He thinks that, even though the effect be proved not to be due to dissolved air, we must look for some cause other than chemical action. For it has long been acknowledged that the decomposition of water requires an electromotive force considerably in excess of that employed in these experiments.—Prof. Gladstone then made a brief communication on the photography of fluorescent substances. He exhibited several photographs taken of white paper on which devices had been previously drawn, with solutions of sulphate of quinine, œsculine, &c., and one was taken in the room. He remarked that the leaves of trees come out dark in a negative, as they contain the fluorescent substance chlorophyll, and suggested that the irregularities of colour observed in photographs of oil paintings are probably due to the intermixture of fluorescent substances in the paints used.—Mr. Meldola referred to Prof. Vogel's experiments on the effect produced on the resulting photograph by the addition of a fluorescent substance to the collodion, thereby increasing the sensitiveness of the plate to particular rays.—Mr. S. P. Thompson, B.A., B.Sc., then gave a summary of the recent experiments made in America by Mr. T. E. Edison, Dr. Beard, Prof. Houston, and others upon the new phase of electric manifestation, the so-called etheric force. This force is characterised by a faint spark, the only evidence, in fact, yet known of its existence. It may be obtained from the iron core of any electromagnet, or from a metallic bar slipped into the coil in place of the core, but only when the battery circuit is being interrupted, as may be done by introducing into the circuit an automatic contact breaker. The sparks so produced are apparently without polarity, devoid of chemical or physiological effect, affect neither electroscopes nor galvanometers, and are stated to be retroactive, being exhibited when one end of a wire through which they are passing is brought round to touch the wire. A detailed description was then given of experiments on this force conducted in the Physical Laboratory at South Kensington, some of which were confirmatory of the published researches of the discoverers, while others were at variance with them. Great pains had been taken to avoid leakage and to distinguish the effects from those of ordinary induced currents. The batteries and coils employed were insulated from the earth as well as from the other portions of the apparatus. A bar of zinc placed above the poles of a powerful electro-magnet, or within its coils, was found to give better results than one of cadmium, which is recommended by the discoverers. The sparks, which resembled those of dynamic electricity, were of inappreciable length and far too faint to ignite gun-cotton or illuminate a delicate Geissler's tube. It was also found that when a bar of zinc was placed within the coil of an electro-magnet in the place of its core and joined by a wire to the gas fittings of the building, faint but distinct sparks could be drawn from any portion of this wire by a second wire proceeding from another part of the gas pipes. Another peculiar effect was observed when the wire attached to one end of the zinc bar, and armed at its extremity with a thin iron wire, was rubbed lightly against the other end of the zinc bar—sparks being thus obtained, apparently passing from one pole of the zinc bar, through the wire, to the other.—Dr. Stone believed he had detected a distinct galvanic taste on applying to the tongue the wire through which the "force" was passing.—Prof. Foster suggested the use of an electrodynamometer to ascertain the electromotive force of the current exhibiting these sparks, as its indications would be independent of direction of current.

Royal Microscopical Society, Feb. 2.—Anniversary Meeting.—H. C. Sorby, president, in the chair.—The Report of the Council and the Treasurer's Annual Statement of Accounts were submitted to the Fellows, and showed that the Society was, at the present time, in a satisfactory and prosperous condition. Votes of thanks to the President and Council for their services during the past year were proposed by Mr. J. Glaisher and carried unanimously. The President then delivered the address, the subject of which was the probable limit of the powers of the microscope with reference to the ultimate size of the molecules of matter, and the general bearing of the conclusions arrived at upon the various germ theories. The following gentlemen were elected as Officers and Council for the ensuing year:—President, Henry Clifton Sorby, F.R.S. Vice-presidents: Charles Brooke, F.R.S., William B. Carpenter, F.R.S., Rev. W. H. Dallinger, Hugh Powell. Treasurer, John Ware Stephenson, F.R.A.S. Secretaries: Henry J. Slack, F.G.S., Charles Stewart, F.L.S. Council: Robert Braithwaite, F.L.S., Frank Crisp, LL.B., John E. Ingpen, Emanuel Wilkins Jones, F.R.A.S., William T. Loy, Henry Lawson, M.D., John Millar, F.L.S., John Rigden Mummery, F.L.S., John Matthews, M.D., Frederic H. Ward, M.R.C.S., Francis H. Wenham, C.E., Charles F. White. Assistant Secretary, Walter W. Reeves.

Institution of Civil Engineers, Feb. 1.—Mr. Geo. Rob. Stephenson, president, in the chair.—The paper read was on the "Holyhead New Harbour," by Mr. Harrison Hayter, M. Inst., C.E.

Victoria (Philosophical) Institute, Feb. 7, Mr. C. Brooke, F.R.S., in the chair.—After the election of new members it was stated that during the past year thirty-three town, sixty-four country, and eighteen foreign and colonial members had joined. A paper on "Heathen Cosmogonies compared with the Hebrew" was read by the Rev. B. W. Savile.

PHILADELPHIA *

Academy of Natural Sciences.—During 1875 a large number of interesting papers and communications were read.—Prof. Cope, in describing some vertebrate fossils from the Saskatchewan district, said that they gave indications of the future discovery of a complete transition from Cretaceous to Eocene life. The collection was chiefly remarkable for the great number and variety of Dinosaurian remains. In another paper Prof. Cope attempted to trace the evolution of the sectorial tooth of Carnivora from the simple quadri-tuberculate molar. He regards the process as having consisted first in an addition of an anterior cusp, and subsequently in the loss of internal and posterior cusps. There had been a progressive extinction of genera with numerous sectorial teeth, with an increasing specialisation of the sectorial tooth in the surviving genera. Parallel with this change was another, in the character of the tibio-astragalar articulation, which he believed to indicate that the American Eocene Carnivora were plantigrade. In describing a new Mastodon from Santa Fé, Prof. Cope divided the North American Mastodons into two groups, the first having teeth with continuous cross-crests divided by a fissure only, the other having transverse series of two or more deeply-separated tubercles. Comparatively recently Prof. Cope announced the discovery of vertebræ and other remains from Illinois, which appear to give the first definite indication of the existence of Rhynchocephalous lizards in the western hemisphere.—Prof. Leidy's contributions have referred chiefly to Rhizopods and Vermes, and to Vertebrate Palæontology. He described a remarkable Rhizopod, which he compared to the reticular pseudopods of a Gromia separated from the body. At one time it appeared as an extremely thin disc with a multitude of minutely ramified and anastomosing pseudopods proceeding from its edge. At other times it divided up into branches from a trunk like a tree. Again it would assume the form of a cord, and the jelly accumulating at some portion of it would run along it like a drop of water on a piece of twine. A granular circulation was observable as in Gromia.—Mr. T. G. Gentry presented an important paper on the phylogeny of the Lepidoptera, suggested by an anomalous development of certain larvæ of *Acronycta oblinita*, without the slightest attempt at cocoon-making.

Other instances among insects were adduced to show the important influence of the surroundings of a species in producing functional changes in its economy, and it was sought to be established that defective nutrition has been a principal cause of cocoons being dispensed with by certain Bombycidæ. From these preliminary considerations the author proceeds to consider the evolution of the various families of Lepidoptera. He believes that the butterflies have as a whole been developed from the Bombycidæ, though that development has probably been accomplished through several roads. He claims the support of palæontological evidence for his views. The earliest moths yet recorded are the Tineids, the lowest family of Lepidoptera; these may be regarded as constituting a persistent type like that of Terebratulas. The Sphinges are supposed to have descended from a Phryganea with Bombycid characters, and many ingenious suggestions and considerations are advanced in support of this view. A hypothetical genealogical tree is given at the close of the paper.—A monographic account of *Nisus* (*Accipiter*) *cooperi* and *N. gundlachi*, by Mr. R. Ridgway, gives the results of careful examination of many specimens. With regard to the former it is found impossible to establish the existence of two geographical races. The distinctness of the latter species is strongly maintained. Mr. Ridgway's account of the Buteonine sub-genus, Craxirex, which is peculiar to America, gives a synopsis of the species. The very variable *Buteo swainsoni* is particularly fully described.—A very interesting paper is contributed by Dr. Elliott Coues, devoted to a vindication of William Bartram as a scientific ornithologist. Dr. Coues seeks to prove that, according to the admitted rules of nomenclature and the rules of the British Association, Bartram has not received his due. He maintains that Bartram's Catalogue of United States Birds is not a mere valueless list, but all the more valuable in consequence of the terseness and simplicity of his descriptions, many of which are unmistakable.—One of the most important papers of the year is by Dr. Lautenbach, on the physiological action of hemlock and its alkaloid. His conclusions, from careful experiments, are as follows:—1. Conia, instead of being poisonous to plants, really acts as a preservative; the alcoholic extract of hemlock, however, acts poisonously on plants. 2. When locally applied, conia produces a progressive loss of functional power in every highly organised tissue with which it comes into contact. 3. In inducing complete repose of the muscular system, conia powerfully predisposes to sleep, but it is not a hypnotic in the sense that opium is. 4. The convulsions produced by a poisonous dose of hemlock are cerebral, and not spinal, as has heretofore been imagined. 5. Conia produces a double effect on the motor-nervous system, a paralysing effect on the periphery of the efferent or motor nerves, and a depression of the motor tracts of the spinal cord. 6. The increase in the number of heart-beats which occurs early in conia poisoning is due to paresis of the pneumogastrics. 7. The primary acceleration in the respiratory movements is also due to pneumogastric paresis. 8. The salivary secretion is the only secretion markedly increased by a poisonous dose of conia. 9. The voluntary muscles escape unscathed in conia-poisoning. 10. Contraction of the pupil only occurs when the drug is directly applied to the eyeball. 11. Conia causes a decided increase in temperature. 12. Conia is absorbed and is eliminated unchanged by the kidneys.

PARIS

Academy of Sciences, Jan. 31.—Vice-Admiral Paris in the chair.—The following papers were read:—Thermal researches on the formation of alcohols and on etherification, by M. Berthelot.—Account of experiments made to determine the work expended by Gramme's magneto-electric machines, used for producing light in the works of MM. Sautter and Lemonnier, by M. Tresca. A direct-illumination photometer was used for comparing an electric lamp with a Carcel lamp, and when equality was had in the two contiguous zones, a dynamometer trace was taken, and the number of turns ascertained. The author gives data of machines, the light from which was equal to 1,830 and 300 Carcel burners respectively. The cost of fuel for the former was only about a hundredth of that of the oil and a fiftieth that of the coal gas.—M. Du Moncel presented the fourth volume of his "Exposé des Applications de l'Electricité" (3rd edition), relating to electric clockwork, electric registers, and applications of electricity to safety appliances in railway service.—Researches on magnetic rotatory polarisation (2nd part), by M. Becquerel. The rotation in diamagnetic bodies increases with the index of refraction. In solutions of a diamagnetic salt of varying concentration, the ratio of the rotation to the weight of the anhydrous salt is a number nearly constant. With salts of iron the magnetic rotation increases much more quickly than the number of active molecules.—Calorific vibrations of a homogeneous solid of uniform temperature, by M. Lucas.—On the formation of hail (second note), by M. Planté. The electrodes of the secondary couples are introduced into salt water, the positive being covered with moistened blotting-paper. A multitude of ovoid globules are scattered out and up from this latter in all directions. M. Planté thinks the electricity in clouds may sometimes act thus, and the globules, rising to a region of lower temperature, become hailstones. Electricity may produce hail through mechanical, calorific, or magneto-dynamic effects.—Letter to the President of the Commission on Phylloxera, by M. Mouillefert.—On the boring operations in the tunnel of Saint Gothard, by M. Colladon. Notwithstanding much greater hardness of rock, &c., than in the boring of Fréjus. M. Favre has, in the third year, realised an advance of 48½ per cent. above the maximum obtained in Fréjus during the thirteen years.—Discovery of the planet (159), by M. Paul Henry.—Note on left curves of the fourth order, by M. Serret.—On the principle of correspondence, and the means it affords of removing some difficulties in analytical solutions, by M. Saltel.—On topographic maps, by M. Hermite.—On the congelation of mercury by use of a mixture of snow and hydrochloric acid, by M. Witz. A mixture, in equal parts, of snow and hydrochloric acid having a temperature of $-1°$, will give a temperature of $-37°{\cdot}5$ C.—On electrolytic aniline black, by M. Goppelsroeder.—On the ferment of urea, by M. Musculus. It has none of the properties of organic ferments, but is rather like soluble ferments, as diastase, saliva, and pancreatic juice.—On the elements of inverted sugar, and their presence in commercial sugar, by M. Maumené.—On digestion in insects; remarks *àpropos* of a recent work of M. Jousset, by M. Plateau. M. Plateau claims priority of observation.—Note on the method to be employed for testing the conductivity of lightning conductors, by M. Michel.—Observations relative to the undulations and fractures of the Cretaceous system, *àpropos* of the project of making a tunnel under the Channel, by M. Robert.—On spontaneous periodic movements in the stems of *Saxifraga sarmentosa*, *umbrosa*, *Geum*, *Acanthifolia*, and in *Parnassia palustris*; relations of this phenomenon with the disposition of the foliar cycle, by M. Heckel.

BOOKS RECEIVED

BRITISH.—Three Months in the Mediterranean: Walter Coote (Stanford).—Lardner's Handbook of Astronomy. 4th edition. Edited by E. Dunkin, F.R.A.S. (Lockwood).—British Manufacturing Industries. Edited by G. Phillips Bevan, F.G.S. 3 vols. (Stanford).—The Races of Mankind. Vol. III.: Dr. Robert Brown (Cassell).—Morocco and the Moors: Dr. Arthur Leared (Sampson Low and Co.)—Memoir of Commodore Goodenough: C. R. Markham (G. Griffin and Co.)—Animal Parasites and Messmates: P. J. Van Beneden (H. S. King and Co.)—First Book of Zoology: E. S. Morse, Ph.D. (H. S. King and Co.)—Livingstone's First and Second Expeditions to Africa. 2 vols. (John Murray)—Reboisement in France: J. Croumbie Brown, LL.D. (H. S. King and Co.)—Telegraphy: W. H. Preece, C.E., and J. Sivewright, M.A. (Longmans).—Tyrol and the Tyrolese: W. A. Baillie Grohman (Longmans).—Food; its Adulterations and the Methods for their Detection: Dr. A. Hill Hassall (Longmans).—Physical Geography: W. D. Cooley (Dulau and Co.)—Short History of Natural Science: A. B. Buckley (John Murray).

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